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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/800,034	03/15/2004	Benjamin Koon Kei Ng	14645	6872
293 7590 07/11/2007 Ralph A. Dowell of DOWELL & DOWELL P.C. 2111 Eisenhower Ave Suite 406 Alexandria, VA 22314			EXAMINER NGO, NGUYEN HOANG	
			ART UNIT 2616	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/800,034

Applicant(s)

KEI NG ET AL.

Examiner

Nguyen Ngo

Art Unit

2616

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 5-7, 10 and 12 is/are rejected.
- 7) ☒ Claim(s) 3, 4, 8, 9, 11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Claim Objections***

1. Claim 11 is objected to because of the following informalities:

Claim 11 states "The method according to claim 6...". Claim 6 however refers to a forward link apparatus.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1 and 6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

**Claims 1 and 6** state "different/same data rate" and "code/information symbol" on lines 6 and 8. These limitations refer to two different meanings and are thus indefinite. Only one limitation should apply, either signal streams are of different data rates or of same data rates. Same rationale is applied to the limitation of "code/information symbol"

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 1, and 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Foschini et al. (US 7116722), hereinafter referred to as Foschini.

**Regarding claim 1, 6** Foschini discloses a spread space spectrum multiple access method for a forward link in a wireless multi-antenna system (method for increasing the capacity of a multiple-input and multiple output system (abstract and figure 6 and figure 7), the method comprising the steps of:

multiplexing signals (the strata representing the sub-stream components are combined in combiners 634-1 to 634-4) at a base station transmitter (transmitter be part of base station, col20 lines 16-24) having multiple antenna elements (antenna 645-1 to 645-4 of figure 6), modulating different signal streams that are of different/same data rate (rate r-1 to rate r-4 of figure 7) using a set of multi-rate/equal-rate space-time diagonal (STD) spreading sequences (each of the sub-stream components is processed by modulators 630-11 to 630-44 of figure 6 to produce strata, col11 lines 35-44), each being assigned a unique STD sequence, which modulates one code/information symbol

over the spreading period, said STD sequences spanning across the spreading period over different transmitting antennas (the codes by the encoders be any codes such as codes in which the bits are independently coded, col11 lines 44-65); and

transmitting the multiplexed signals through the multiple antenna elements at the base station wherein signals are transmitted simultaneously a signal being transmitted as a sequence of channel code symbols, where each such symbol is a sequence of direct sequence spread spectrum chips, the sequence of chips (block of chips) is subdivided into a set of sub-blocks, where each sub-block is transmitted sequentially over a different antenna (segments of each processed sub-stream are transmitted over different ones of the transmit antennas cyclically and that each processed sub-stream is cycled over the transmit antennas, each of the transmitted signals 645-1 to 645-4 emanating from transmit antennas 105-1 to 105-4, col12 lines 23-27 and col13 lines 10-20 and figure 7 and figure 8).

Foschini however fails to specifically disclose that the signals (sub-streams) are from different users and discloses that the sub-streams are from a primitive data stream, which is demultiplexed (col11 lines 20-28 and figure 6). Foschini however discloses that the method be implemented in a wireless communication system comprising a base station and mobile terminals (col20 lines 15-30) and further discloses that the sub-streams may be of different bit rates (col12 lines 50-55). It is further well known in the art that a data stream comprises signals from different users. Thus it would have been obvious to a person skilled in the art at the time the invention was

made to have sub-streams be derived directly from multiple users instead of a demux in order to account for possible alternative configurations in a system, such as multiple users providing data streams to the base station (col20 lines 61-68).

5. Claims 2, and 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Foschini et al. (US 7116722), in view of Agrawal et al. (US 2005/0013239), hereinafter referred to as Foschini and Agrawal.

**Regarding claim 2, 7** Foschini fails to specifically disclose have each STD sequence be represented by a matrix, where each column has one non-zero value, and wherein elements along a given row represents the chips transmitted on the antenna corresponding to that row. Agrawal however discloses of a transmit basis matrix for MIMO systems that is defined such that each data symbol stream is transmitted from all antennas and each transmit symbol stream is transmitted at the full power associated with the associated antenna (abstract and page 3 [0045] and page 6 [0087]). It would have thus been obvious to a person skilled in the art at the time the invention was made to incorporate the concept of a transmit matrix as disclosed by Agrawal into the method for increasing the capacity of a MIMO system as disclosed by Foschini in order to efficiently determine and transmit data from a transmitter (base station) with a plurality of antennas.

6. Claims 5, 10 and 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Foschini et al. (US 7116722), in view of Kadous et al. (US 2004/0121730), hereinafter referred to as Foschini and Kadous

**Regarding claim 5, 10, 12,** Foschini fails to specifically disclose including a set of user-specific interleavers as claimed. However Kadous discloses that each data stream is coded and interleaved by a respective set of encoder and channel interleaver (page 8 [0108]) in the same field of endeavor. It is further well known in the art that interleaving is used in digital data transmission technologies to protect the transmission against burst errors. It would have thus been obvious to a person skilled in the art at the time the invention was made to incorporate a channel interleavers as disclosed by Kadques into the method for increasing the capacity of a MIMO system as disclosed by Foschini in order to efficiently protect transmissions against burst errors.

#### ***Allowable Subject Matter***

7. Claims 3, 4, 8, 9 and 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

#### ***Conclusion***

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a) Kim (US 2007/0105503), Systems and methods for reducing uplink resources to provide channel performance feedback for adjustment of downlink MIMO channel data rates.
- b) Foschni et al. (US 2002/0142723), Transmission scheme for multi-carrier MIMO systems.
- c) Walton et al. (US 7194042), Data transmission with spatial spreading in a MIMO communication system.
- d) Krishnan et al. (US 2004/0165676), Transmission schemes for multi-antenna communication systems utilizing multi-carrier modulation.
- e) Walton et al. (US 7002900) Transmit diversity processing for a multi-antenna communication system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nguyen Ngo whose telephone number is (571) 272-8398. The examiner can normally be reached on Monday-Friday 7am - 3:30 pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wing Chan can be reached on (571) 272-7493. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 2616

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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